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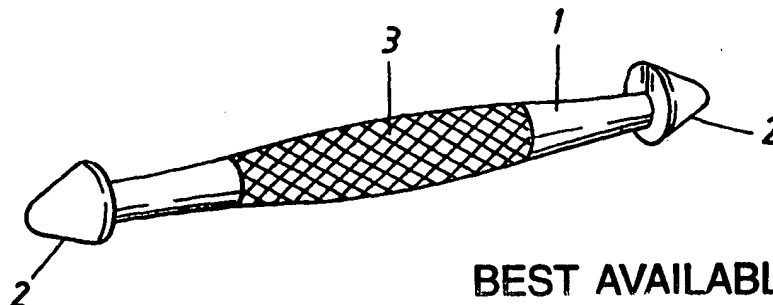
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(54) Title: DEVICE FOR REPAIRING DAMAGED SURFACE OPTICAL READABLE DISCS



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(57) Abstract: A device for restoring damaged surface layers of optically readable discs having a body (1) for manual repair comprising at least two grinding/polishing surfaces (2) with grinding/polishing materials of different fineness, wherein the grinding/polishing material is a polymer based material with micro crystals of diamond, glass or silicon carbide. Manual use of a grinding/polishing material that is polymer silicon carbide for restoring a damaged surface layer of optical readable discs.

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DEVICE FOR REPAIRING DAMAGED SURFACE OPTICAL READABLE DISCS

5 The present invention relates to a device for restoring a damaged surface layer of optical readable discs, such as CD, CD-rom, DVD-discs or discs for Playstation or discs containing computer programs. Such discs usually comprise a protective layer of polymeric material.

10 Optical readable discs can easily be damaged, for example be scratched, so that the information stored on the optical disc is not possible to read. Then, the disc has to be discarded. However, there is a possibility to send the damaged disc to a couple of companies in the USA that have a machine for  
15 repairing optical discs. This is very expensive and is only appropriate in particularly important cases.

20 Such a known machine is disclosed in JP 08263881 A. A motor driven grinding wheel rotates against a rotating optical disc to be repaired, wherein also the optical disc is rotated with the aid of a motor. The Japanese patent application discusses how one in this manner can achieve an even grinding across the entire surface.

25 Another machine is disclosed in US 5593343, in which a disc to be repaired also is rotated by a motor and a motor driven grinding wheel rotates against the optical disc. In this case also supply of cutting medium is required. A similar machine  
30 is also disclosed in EP 342 359.

35 All of these documents teach that high velocities between grinding wheel and disc are required in order to be able to obtain a surface that again provides perfect function of the optical readable disc, i.e. motor driven devices are required.

40 Now the inventor surprisingly has shown that it is possible to manually repair damages of optical readable discs by using a special grinding cloth used by certain jewellers for grinding/polishing metal.

5       The object of the present invention is to provide a device for manual repair of damaged optical readable discs. The characterising features of the invention are stated in the following claims.

10       The fact that there are at least two grinding/polishing surfaces of different fineness on the device, the repair of an optical readable disc may take place in at least two stages, where the damage first is manually treated with a coarser material surface and then is polished up with a finer  
15       material surface.

      An advantage of the fact that the grinding/polishing material is polymer based is its softness that provides a damping effect when grinding/polishing. This is enhanced if the micro  
20       crystals for example are bound in or arranged on a polymer body of a crude or synthetic rubber or a non-rigid plastic. This is also enhanced if the polymer based grinding material is arranged on a grinding cloth that encloses a polymer body of a crude or synthetic rubber or non-rigid plastic.  
25       Preferably, the grinding and polishing element has a "sense of india rubber" , i.e. provides a soft counter pressure.

      The invention will now be described with reference to the accompanying drawings, in which:

30       Figure 1     shows a first embodiment of the present invention.

      Figure 2     shows a second embodiment of the present  
35       invention.

      Figure 3     shows a pawl arrangement to the second embodiment of the present invention.

40       Figure 4     shows a perspective view of a third embodiment of the present invention.

5        Figure 5        shows a cross-section of the third embodiment.

Figure 6        shows an exchangeable grinding or polishing  
element.

10       Figure 7        shows a cross-section of the grinding or  
polishing element.

The invention consists of a body 1 comprising at least two  
grinding and/or polishing surfaces 2 with grinding/polishing  
15       materials of different fineness, wherein the  
grinding/polishing material is a polymer based material as a  
binding medium for micro crystals of diamond, glass or  
silicon carbide.

20       For example the polymer based material may be a crude or  
synthetic rubber or a non-rigid plastic. In a modification  
the micro crystals may be bound in the polymer based  
material at a high concentration or saturation.  
Alternatively, the micro crystals (plain or bound in the  
25       polymer based material) may be coated on a polymer body, for  
example by gluing.

The two (or more) surfaces 2 should take the shape of  
elements 11, which are removably arranged at the body 1 so  
30       that they can be exchanged when worn out or if different  
material fineness is desired in the surfaces 2.

According to a first embodiment, see figure 1, the body 1 is  
elongated, for example like a pencil, and is convenient to  
35       hold. A grip surface 3 of for example rubber is preferably  
arranged on the body to enable a good grip between the hand  
and the body 1 when in use. In the embodiment shown there  
are two grinding/polishing surfaces 2, one at each end of  
the body 1.

40

In this case they take the shape of "hats" completely made  
of the polymer based material with micro crystals of

5 diamond, glass or silicon carbide or consist of a carrier  
body covered with a cloth with the polymer based grinding  
material arranged on the external side. For example the hats  
can be secured by screwing, be kept in place by friction or  
be snap-in locked or be clamped by lock and clip,  
10 respectively. As realised by the skilled man the body 1 may  
take any shape and the grinding and polishing surfaces 2 may  
be optionally located.

According to a second embodiment of the present invention  
15 the body 1 comprises a through hole 4, see figure 2, in  
which the cartridges of a number (three in the figure)  
cartridges 5 form a queue. Each cartridge 5 is provided with  
a grinding/polishing surface 2, wherein the fineness of the  
grinding/polishing material is different for each cartridge  
20 5. These cartridges 5 are arranged within the hole 4 in the  
order to be used, namely the coarsest grinding/polishing  
surface first and then finer and finer.

When the first cartridge 5 has been used it is taken out of  
25 the body 1 and is entered into the opposite end 9 of the  
hole 4 of the body 1 with the end provided with the  
grindings/polishing surface first. As a result the remaining  
cartridges 5 are pushed forwards in the body 1 until the  
entire first cartridge 5 has been inserted into the body 1  
30 from the opposite direction. At this stage the next  
cartridge 5 projects sufficiently from the front end 10 of  
the body 1 to enable operation.

To prevent movement of the cartridges 5 backwards in the  
35 body 1 each cartridge may be provided with for example a  
pawl 6, see figure 3, that co-operates with a bevelled teeth  
row 7 or rail on the internal side of the hole 4 of the body  
2. When the cartridge 5 is pushed forward in the body 1 the  
pawl 6 yields inwardly by obliquely forwards projecting  
40 teeth 8 and then the pawl 6 springs out again then the  
respective tooth 8 has been passed. If the cartridge 5 is  
pushed backwards the pawl 6 will abut a surface of a tooth 8

5 which is substantially orthogonal towards the extension of the teeth row 7 and thereby prevents movement of the cartridges 5 backwards in the body 1. When one or more cartridges 5 have been worn out it is a simple matter to replace these.

10 Figures 4 and 5 show a third embodiment of the device according to the invention. The body 1 comprises two cavities 12 intended to receive and retain two grinding and polishing elements 11 (see figure 6). The elements 11  
15 preferably have different degrees of fineness. These two elements 11 are in their position of use. In addition, the body 1 also comprises preferably cavities 13 for storing spare elements or elements with different degree of fineness from the two that are arranged in the cavities 12. The  
20 elements 11 are retained by snap-in action between indentations 14 on the end sides of the cavities 12, 13 and projections 14 on the end sides of the elements 11.

25 Figures 6 and 7 show a grinding or polishing element 11 according to the invention. The element 11 has a grinding surface 2 and a holder part 16. The holder part 16 is preferably provided with notches 17 to improve the grip of the element 11. For example, the grinding surface 2 may  
30 comprise a supporting body 18 covered with a cloth 19 with the polymer based grinding material arranged on the external side, as appears from the cross-section of figure 7, or the entire portion placed in the holder part 16 may consist of the polymer based grinding material or alternatively the  
35 micro crystals (plain or bound in the polymer based material) may be coated on the polymer body 18.

40 When using the device according the invention the damaged optical disc is held by one hand and the damage is treated by the device held by the other hand. First, the surface comprising the coarsest grinding/polishing material is used until the damage has disappeared and the area is matted. Then the surface comprising the finer grinding/polishing

- 5 material is used to polish up the matted disc surface. Of course, the process may be carried out in for example three or more stages if desired. In such a case a device with at least three or more different surfaces of grinding/polishing material may be used.

5        **CLAIMS**

1. A device for restoring damaged surface layers of optical readable discs, **characterised by** a body (1) for manual repair comprising at least two grinding/polishing surfaces (2) with grinding/polishing material of different fineness, wherein the grinding/polishing material is a polymer based material with micro crystals of diamond, glass or silicon carbide.
2. A device according to claim 1, wherein the grinding/polishing surfaces (2) are removably attached to the body (2).
3. A device according to claims 1 or 2, wherein the grinding/polishing surfaces (2) take the shape of grinding/polishing hats.
4. A device according to any of the presiding claims, wherein the device takes the shape of an elongated body (1) with the first and second grinding/polishing surfaces (2) are arranged at opposite ends.
5. A device according to claim 1 or 2, wherein the body (1) comprises a hole (4) in which at least two cartridges (5) are arranged, and each cartridge is provided with a grinding/polishing surface of grinding/polishing materials of different fineness.
6. Manual use of a grinding/polishing material that is polymer based and comprises micro crystals of diamond, glass or silicon carbide for restoring damaged surface layers of optical readable discs.



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Fig.1

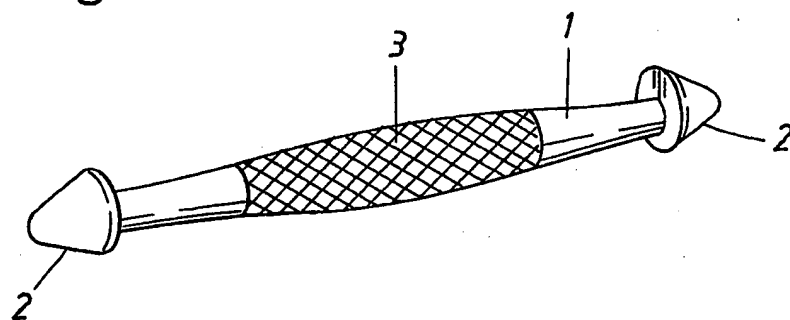


Fig.2

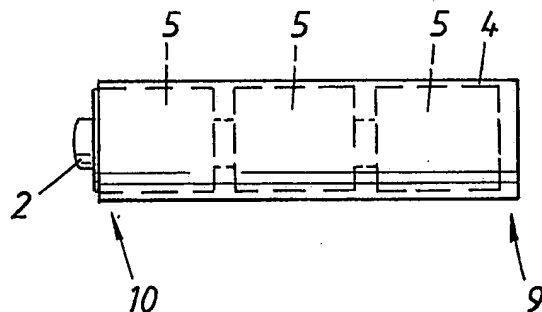
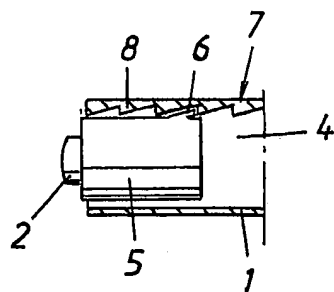


Fig.3



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Fig 4

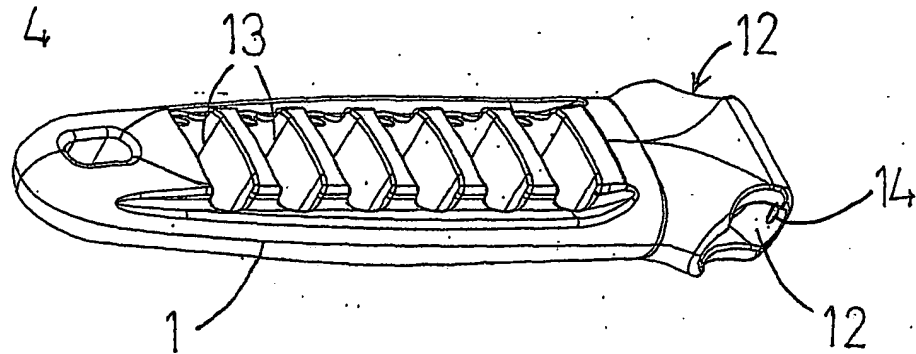


Fig 5

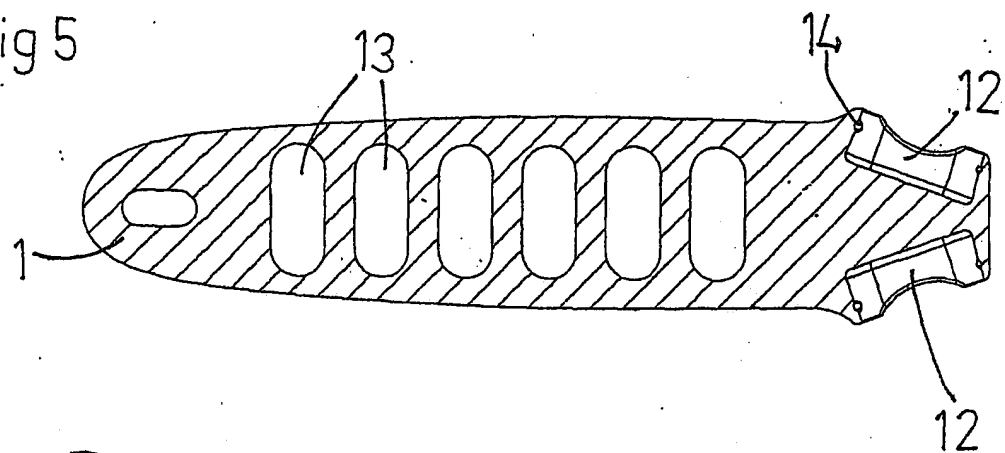


Fig 6

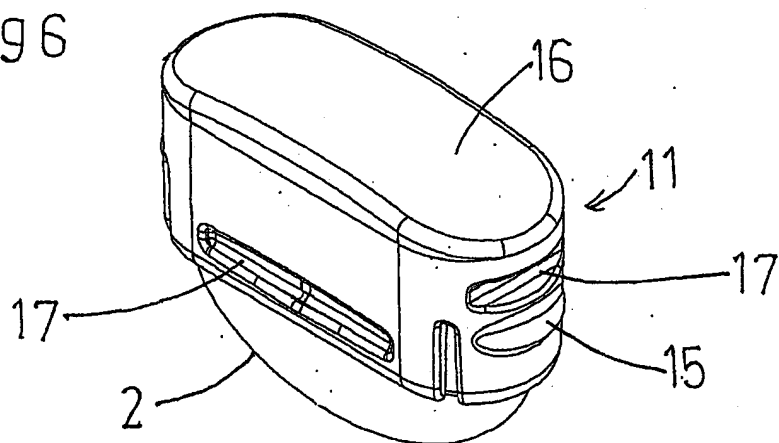
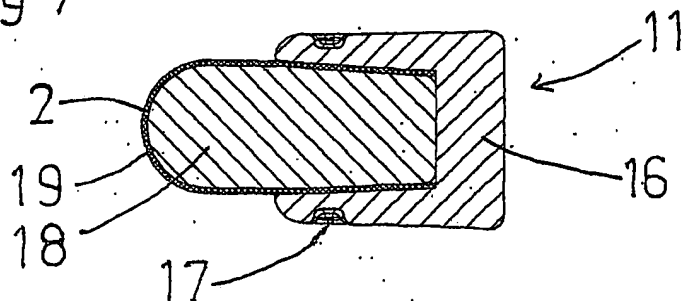


Fig 7



# INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 02/00508

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G11B 23/50, B24D 3/22, B24D 15/00, C09G 1/16  
According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B24B, B24D, C09G, G11B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	JP 10172265 (OGAWA KAZUO) 1998-09-30 (abstract).(online) (retrieved on 2002-07-16). Retrieved from: EPO PAJ Database  --	1-3
A	RU 2038944 C1 (GERASIMOV S A) 1995-07-09 (abstract) World Patents Index(online).London.U.K.: Derwent Publications, Ltd. (retrieved on 2002-07-16). Retrieved from: EPO WPI Database.DW199613, Accession No. 1996-127503  --	1,6

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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Date of the actual completion of the international search

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International application No.

PCT/SE 02/00508

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	JP 2021477 (CANON INC) 1990-03-30 (abstract). (online)(retrieved on 2002-07-16).Retrieved from: EPO PAJ Database  -- -----	1

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

06/07/02

PCT/SE 02/00508

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3688450 A	05/09/72	NONE	

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